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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the electro photography photo conductor made to contain in the photosensitive layer made to form on a conductive substrate in more detail about an electro photography photo conductor.

[0002]

[Description of the Prior Art]Conventionally, in electrophotographic technology, although selenium, a cadmium sulfide, an amorphous silicon, a zinc oxide, etc. which are mineral matter are widely used for the photosensitive layer of an electro photography photo conductor, many researches using the photoconductivity material of an organic substance as an electro photography photo conductor are done in recent years.

[0003]When the fundamental character needed as an electro photography photo conductor here is hung up, the electrostatic property of the electric charge according [on (1) dark place and] to corona discharge is high, (2) In a dark place, attenuation has few electric charges by acquired corona electrical charging, (3) It is that there is little change of electrophotographic properties by that there is little bottom of the increase in the rest potential by the time of that an electric charge dissipates promptly by the exposure of light, that there is little residual charge after the exposure of (4) lights, and (5) repeated use and the decrease of initial potential, (6) atmospheric temperature, and humidity etc.

[0004]Although selenium, a cadmium sulfide, etc. which are the conventional mineral matter electro photography photo conductors are provided with the conditions as a photo conductor in respect of fundamental character, they have a fault, like that there is no plasticity not much and a manufacturing cost is high with strong, a manufacturing problem, for example, toxicity, difficult coat nature. these mineral matter that will be seen in the future and that has a limitation in production by exhaustion of resources if it becomes -- also in the field of the public nuisance

by toxicity, use of the photo conductor of an organic substance is desired from mineral matter. In view of these points, research of the electro photography photo conductor which consists of organic substances in recent years is done briskly, the electro photography photo conductor using various organic substances is proposed, and some which are put in practical use have it.

[0005]Seeing generally, compared with an inorganic substance, it is good, and transparency is lightweight, and is easy also for membrane formation nature, and the organic matter has both positive and negative electrostatic property.

It has an advantage, like manufacture of a photo conductor is also easy and there is.

Although a polyvinyl carbazole and its dielectric are one of typical things of the electro photography photo conductor of the organic system proposed until now, for example, These do not necessarily have coat nature, plasticity, solubility, an enough adhesive property, etc.,

Although there are also improved things, such as what carried out sensitization of the polyvinyl carbazole with pilus RYUUMU salt coloring matter (JP,48-25658,B), and a thing (U.S. Pat. No. 3484237) which carried out sensitization by a polyvinyl carbazole and 2,4,7-TORITRO nitro fluorenon, What satisfies the demand of the fundamental character as a photo conductor hung up previously demanded and also a mechanical strength, high durability, etc. is not yet obtained fully.

[0006]

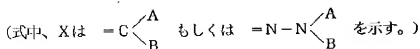
[Problem(s) to be Solved by the Invention]The purpose of this invention is to provide the electro photography photo conductor which has high durability by high sensitivity. It excels in the stability to temperature and humidity especially, and an electrifying characteristic is high, and repeated use is also that the fall of photosensitivity provides the electro photography photo conductor which hardly happens.

[0007]

[Means for Solving the Problem]As a result of studying a photoconductivity substance which has high sensitivity of the above-mentioned purpose, and high durability, this invention persons find out that N-FENIRU which has a specific structure and N-NAFU chill enamine derivative are effective, and came to complete this invention. namely[0008]An electro photography photo conductor of this invention made N-FENIRU and N-NAFU chill enamine derivative which are shown by following general formula (I) in a photosensitive layer made to form on a conductive substrate contain.

[0009]

[Formula 8]

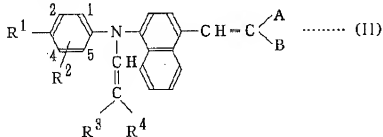


[0010][-- here, A and B are an aryl group which may have hydrogen, a low-grade alkyl group, and a substituent, an aralkyl group which may have a substituent, or a heterocycle group which may have a substituent, and also A and B may form a ring mutually (it ****, and when both A and B are hydrogen and a low-grade alkyl group, it removes). R¹ and R² are hydrogen, a lower alkoxy group, a low-grade alkyl group, or halogen, and also R¹ and R² may form a ring mutually. R³ and R⁴ are an aryl group which may have hydrogen, a low-grade alkyl group, and a substituent, or a heterocycle group which may have a substituent (it ****, and when both R³ and R⁴ are hydrogen, it removes).]

[0011]An invention of the first of an electro photography photo conductor of this invention made N **FENIRU and an N-4 **BINIRU naphthyl enamine derivative (henceforth a vinyl naphthyl enamine derivative) which are shown by following general formula (II) in a photosensitive layer made to form on a conductive substrate contain.

[0012]

[Formula 9]

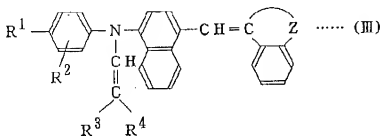


[0013]R¹ and R² are hydrogen, a lower alkoxy group, a low-grade alkyl group, or halogen among [type, and also R¹ and R² may form a ring mutually. R³ and R⁴ are an aryl group which may have hydrogen, a low-grade alkyl group, and a substituent, and a heterocycle group which may have a substituent (it ****, and when both R³ and R⁴ are hydrogen, it removes). A and B are an aryl group which may have hydrogen, a low-grade alkyl group, and a substituent, an aralkyl group which may have a substituent, or a heterocycle group which may have a

substituent, and also A and B may form a ring mutually (it ****, and when both A and B are hydrogen and a low-grade alkyl group, it removes). As a desirable compound of the vinylnaphthyl enamine derivative shown by] general formula (II), the compound shown by following general formula (III) and (IV) can be raised.

[0014]

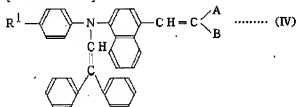
[Formula 10]



(Z is residue required to form a five-membered ring and six membered-rings among a formula, and R^1 , R^2 , R^3 , and R^4 are the same as that of the above.)

[0015]

[Formula 11]

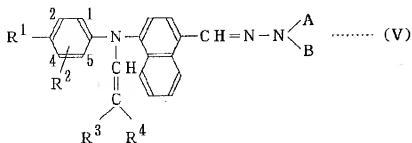


(R^1 in a formula, A, and B are the same as the above.) The electro photography photo conductor which is a vinylnaphthyl enamine derivative in which said photo conductor contains charge transfer material and charge generating material, and the charge transfer material concerned is shown by said general formula (II) again is preferred.

[0016]The invention of the second of the electro photography photo conductor of this invention is characterized by making the enamine group content hydrazone compound shown by following general formula (V) in the photosensitive layer made to form on a conductive substrate contain.

[0017]

[Formula 12]

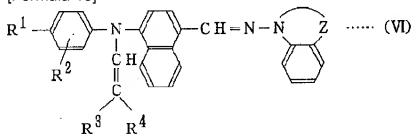


[0018] R^1 and R^2 are hydrogen, a lower alkoxy group, a low-grade alkyl group, or halogen among [type, and also R^1 and R^2 may form a ring mutually. R^3 and R^4 are an aryl group which may have hydrogen, a low-grade alkyl group, and a substituent, or a heterocycle group which may have a substituent (it ****, and when both R^3 and R^4 are hydrogen, it removes). A and B are an aryl group which may have a low-grade alkyl group and a substituent, an aralkyl group which may have a substituent, or a heterocycle group which may have a substituent, and also A and B may form a ring mutually.]

[0019] As a desirable compound of the enamine group content hydrazone compound shown by general formula (V), the compound shown by following general formula (VI) and (VII) can be raised.

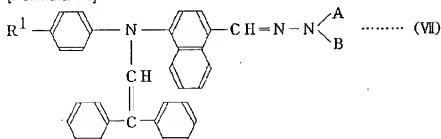
[0020]

[Formula 13]



[0021] (Z is residue required to form a five-membered ring and six membered-rings among a formula, and R^1 , R^2 , R^3 , and R^4 are the same as that of the above.)

[Formula 14]



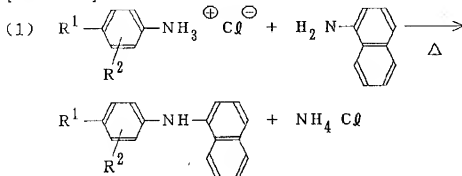
(R^1 , A, and B are the same as the above among a formula.) The electro photography photo

conductor which is an enamine group content hydrazone compound in which said photo conductor contains charge transfer material and charge generating material, and the charge transfer material concerned is shown by said general formula (V) again is preferred.

[0022]The vinylnaphthyl enamine derivative shown by general formula (II) in connection with this invention is usually compounded in the process of the following reaction formulae (1), (2), (3), and (4).

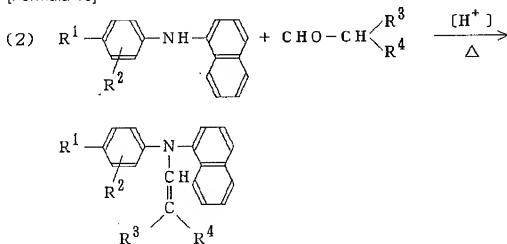
[0023]

[Formula 15]



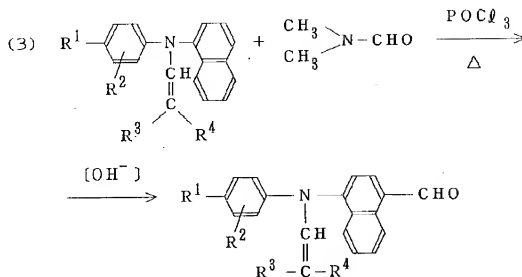
[0024]

[Formula 16]



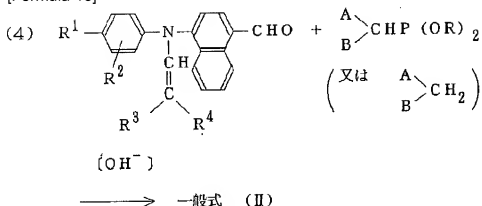
[0025]

[Formula 17]



[0026]

[Formula 18]



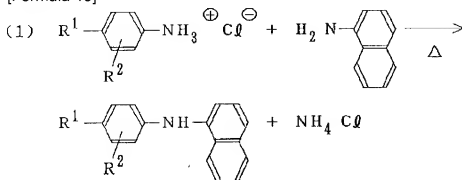
(Except that R of a formula (4) in the above-mentioned reaction formula is a low-grade alkyl group, each sign is synonymous with general formula (II).)

[0027] That is, in (1), secondary amine is obtained by a pyrogenetic reaction in autoclave. In (2), enamine compounds are obtained by using this secondary amine and aldehyde as P**TORU ene sulfonic acid, and carrying out a pyrogenetic reaction by making an acetic anhydride into a catalyst. In (3), a formyl compound is obtained under existence of a phosphoryl chloride by what is called a BIRUSUMA year reaction that makes N and N dimethylformamide react to these enamine compounds. In (4), under existence of an alkaline catalyst, a compound which contains the substituents A and B in this formyl compound is made to react, and the target vinylnaphthyl enamine derivative is obtained.

[0028] An enamine group content hydrazone compound of ***** general formula (V) is compounded by this invention in a process of the following reaction formulae (1), (2), (3), and (4').

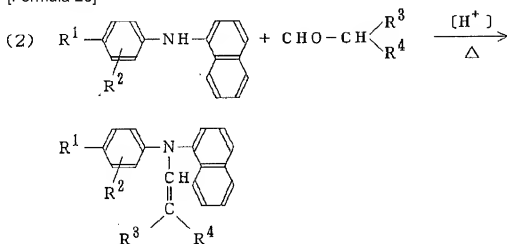
[0029]

[Formula 19]



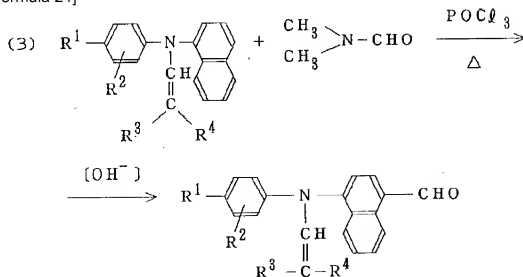
[0030]

[Formula 20]



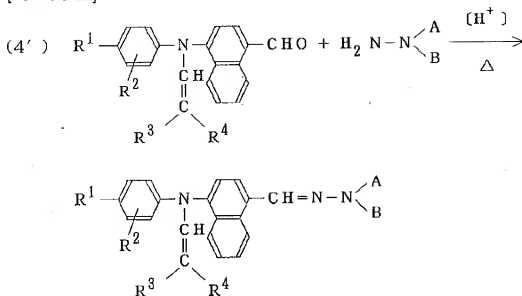
[0031]

[Formula 21]



[0032]

[Formula 22]

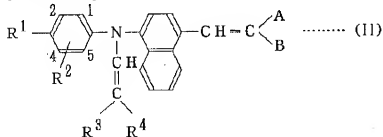


[0033] That is, in (1), secondary amine is obtained by a pyrogenetic reaction in autoclave. In (2), enamine compounds are obtained by using this secondary amine and aldehyde as P**TORU ene sulfonic acid, and carrying out a pyrogenetic reaction by making an acetic anhydride into a catalyst. In (3), a formyl compound is obtained under existence of a phosphoryl chloride by what is called a BIRUSUMA year reaction that makes N and N dimethylformamide react to these enamine compounds. In (4'), under existence of acid, N**JI substitution hydrazine compound is made to react to this formyl compound, and the target enamine group content hydrazone compound is obtained.

[0034] Although an illustration compound as a substituent of general formula (II) shows in the next tables 1-3, respectively is mentioned, for example as a concrete example of a vinyl naphthyl enamine derivative shown by the following general formula (II) used for an electro photography photo conductor of this invention, It is not a thing to which a compound of this invention is limited by this and which is carried out.

[0035]

[Formula 23]



It ****, ** 24 in Table 1 - 6 - the-izing 43 express the basis shown by the following formula, and

Ph expresses a phenyl group.

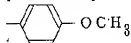
[0036]

[Formula 24]



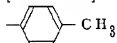
[0037]

[Formula 25]



[0038]

[Formula 26]



[0039]

[Formula 27]



[0040]

[Formula 28]



[0041]

[Formula 29]



[0042]

[Formula 30]



[0043]

[Formula 31]



[0044]

[Formula 32]



[0045]

[Formula 33]



[0046]

[Formula 34]



[0047]

[Formula 35]



[0048]

[Formula 36]



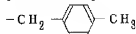
[0049]

[Formula 37]



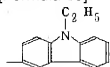
[0050]

[Formula 38]



[0051]

[Formula 39]



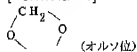
[0052]

[Formula 40]



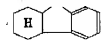
[0053]

[Formula 41]



[0054]

[Formula 42]



[0055]

[Formula 43]



[0056]

[Table 1]

例示 化合 物No.	一般式 (II) の置換基					
	R ¹	R ²	R ³	R ⁴	A	B
1	H	H	-CH ₃	-CH ₃	H	-Ph
2	H	H	-CH ₃	-CH ₃	H	化24
3	H	H	-CH ₃	-CH ₃	-Ph	-CH ₃
4	H	H	-Ph	-Ph	-Ph	-Ph
5	-CH ₃	H	-CH ₃	-CH ₃	H	-Ph
6	-CH ₃	H	-CH ₃	-CH ₃	H	化25
7	-CH ₃	H	-CH ₃	-CH ₃	H	化26
8	-CH ₃	H	-CH ₃	-CH ₃	-Ph	-Ph
9	-CH ₃	H	-CH ₃	-CH ₃	H	化27
10	-CH ₃	1-CH ₃	-CH ₃	n-C ₃ H ₇	H	化28
11	-CH ₃	1-CH ₃	-Ph	-Ph	H	-Ph
12	-CH ₃	1-C1	-Ph	-Ph	H	-Ph
13	-CH ₃	1-OCH ₃	-Ph	-Ph	H	化27
14*	-C ₂ H ₅	H	-Ph	-Ph	H	-Ph
15	-C ₂ H ₅	H	-CH ₃	-Ph	-CH ₃	-Ph
16*	n-C ₃ H ₇	H	-Ph	-Ph	H	-Ph
17	n-C ₃ H ₇	H	化25	化25	H	化25
18	n-C ₄ H ₉	H	-Ph	-Ph	-Ph	-Ph
19	H	H	-CH ₃	-Ph	-Ph	-Ph
20	H	H	-Ph	-Ph	H	化29
21	H	2-CH ₃	-Ph	-Ph	H	化27
22	H	2-CH ₃	-Ph	-Ph	H	化25
23	H	2-C1	-CH ₃	-Ph	H	-Ph

[Table 2]

例示 化合 物No.	一般式 (II) の置換基					
	R ¹	R ²	R ³	R ⁴	A	B
24*	-CH ₃	H	-Ph	-Ph	H	-Ph
25*	-CH ₃	H	-Ph	-Ph	H	化24
26*	-CH ₃	H	-Ph	-Ph	H	化26
27*	-CH ₃	H	-Ph	-Ph	(化30)	
28	-CH ₃	H	-Ph	-Ph	(化31)	
29	-CH ₃	1-CH ₃	-Ph	-Ph	(化30)	
30	-OCH ₃	H	-CH ₃	-CH ₃	H	化32
31	-OCH ₃	H	-CH ₃	-CH ₃	H	-Ph
32	-OCH ₃	H	-CH ₃	-Ph	H	化28
33	-OCH ₃	H	化32	化32	H	-Ph
34*	-OCH ₃	H	-Ph	-Ph	H	-Ph
35	-OCH ₃	2-OCH ₃	-Ph	-Ph	H	化26
36	-OCH ₃	2-OCH ₃	化33	化33	H	化34
37	-OCH ₃	1-Cl	-Ph	-Ph	-CH ₃	-Ph
38	-OCH ₃	1-Cl	-CH ₃	-Ph	-Ph	-Ph
39	-OCH ₃	1-CH ₃	-Ph	-Ph	H	化27
40	-OC ₂ H ₅	H	化25	化25	H	化24
41	-OC ₂ H ₅	H	-Ph	-Ph	H	化35
42	-OC ₂ H ₅	-OC ₂ H ₅	-Ph	-Ph	H	-Ph
43	-OC ₃ H ₇	H	化26	化26	H	-Ph
44	-OC ₃ H ₇	H	-Ph	-Ph	H	化27
45	-OCH ₂ Ph	H	-CH ₃	-Ph	-Ph	-Ph

[Table 3]

例示 化合 物No.	一般式 (II) の置換基					
	R ¹	R ²	R ³	R ⁴	A	B
46	-OCH ₃	H	H	-Ph	(化31)	
47*	-OCH ₃	H	-Ph	-Ph	(化31)	
48	-OCH ₃	2-OCH ₃	化25	化25	(化30)	
49*	(化36)		-Ph	-Ph	H	-Ph
50*	(化36)		-Ph	-Ph	H	化25
51*	(化36)		-Ph	-Ph	-Ph	-Ph
52	-Cl	H	-CH ₃	-Ph	H	-Ph
53	-Cl	H	-Ph	-Ph	H	化26
54	-Cl	H	-Ph	-Ph	-Ph	-Ph

55	-C 1	H	-CH ₃	-P h	H	化 2 4
56	-C 1	1 -C 1	-P h	-P h	H	-P h
57	-C 1	1 -C 1	-P h	-P h	H	化 2 5
58	-C 1	2 -C 1	-P h	-P h	H	-P h
59	-C 1	1 -CH ₃	-P h	-P h	H	-P h
60	-C 1	1 -CH ₃	-CH ₃	-C ₂ H ₅	H	-P h
61	-B r	H	化 2 7	化 2 7	H	化 2 9
62	-B r	H	-P h	-P h	H	-P h
63	-B r	H	-P h	-P h	H	化 3 7
64	(	化 3 6	)	-CH ₃	-CH ₃	H -P h
65*	(	化 3 6	)	-P h	-P h	(化 3 0)
66	(	化 3 6	)	化 2 5	化 2 5	(化 3 0)
67	(	化 3 6	)	-P h	-P h	(化 3 1)

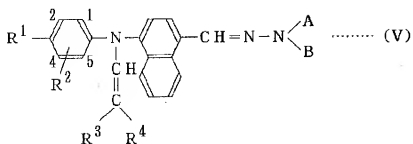
[0057] In these illustration compound, excel in electrophotographic properties, and R¹ the thing with few problems also in a cost aspect and a synthesis face A methyl group, They are an ethyl group, a methoxy group, an ethoxy basis, Krol, and a methylenedioxy group, As for R², both hydrogen, R³, and R⁴ A phenyl group, Both is [a phenyl group or one side of A and B] a phenyl group or a naphthyl group, It is illustration compound No. 14 specifically shown by * seal in Table 1 - 3, No. 16, No.24, No. 25, No. 26, No. 27, No. 34, No. 47, No. 49, No. 50, No. 51, No. 65, etc.

[0058] 4-(2, 2 **JIFE nil vinyl) triphenylamine, 9-(4 **METOKISHI phenyl)-3-(4 **METOKISHI styryl) carbazole, By mixing styryl compounds, such as a 4-(3, 5 **JIME chill styryl)-4' **MECHIRU triphenylamine, a hydrazone compound, an oxazol compound, a triphenylamine compound, enamine compounds, etc., also when highly efficient nature demonstrates, it thinks.

[0059] Although an illustration compound as the substituent of general formula (V) shows in the next tables 4-6, respectively, for example is mentioned as a concrete example of the enamine group content hydrazone compound shown by general formula (V) used for the electro photography photo conductor of this invention, the compound of this invention is not limited by this.

[0060]

[Formula 44]



[0061]

[Table 4]

例示 化合 物No.	一般式 (V) の置換基					
	R^1	R^2	R^3	R^4	A	B
101	H	H	H	-Ph	-Ph	-Ph
102	H	H	-CH ₃	-CH ₃	-Ph	-Ph
103	H	H	-CH ₃	-Ph	-Ph	-Ph
104	H	H	-Ph	-Ph	-Ph	-Ph
105	H	H	-Ph	-Ph	-CH ₃	-Ph
106	H	H	-Ph	-Ph	-C ₂ H ₅	化26
107	H	H	-Ph	-Ph	-CH ₂ Ph	化26
108	H	H	化25	化25	n-C ₃ H ₇	化27
109	-CH ₃	H	H	-Ph	-Ph	-Ph
110	-CH ₃	H	H	-Ph	-CH ₃	-Ph
111	-CH ₃	H	H	-Ph	-Ph	-Ph
112	-CH ₃	H	-CH ₃	-CH ₃	-Ph	-Ph
113	-CH ₃	H	H	n-C ₃ H ₇	-CH ₃	-Ph
114	-CH ₃	H	-CH ₃	-Ph	化25	化25
115*	-CH ₃	H	-Ph	-Ph	-CH ₃	-Ph
116*	-CH ₃	H	-Ph	-Ph	-Ph	-Ph
117	-CH ₃	H	-Ph	-Ph	化38	化26
118*	-CH ₃	H	化25	化25	-Ph	-Ph
119	-CH ₃	2-CH ₃	-CH ₃	-CH ₃	-Ph	-Ph
120	-CH ₃	2-CH ₃	-Ph	-Ph	-CH ₃	-Ph
121	-CH ₃	2-CH ₃	-Ph	-Ph	-Ph	-Ph
122	-CH ₃	1-CH ₃	-CH ₃	-Ph	-CH ₂ Ph	化39
123	-CH ₃	2-Cl	-Ph	-Ph	-Ph	-Ph

[Table 5]

例示 化合 物No.	一般式 (V) の置換基					
	R ¹	R ²	R ³	R ⁴	A	B
124	-CH ₃	2-C l	化 2 5	化 2 5	-C ₂ H ₅	-P h
125	-CH ₃	H	-P h	-P h	n-C ₃ H ₇	化 4 0
126*	-C ₂ H ₅	H	-CH ₃	-P h	-P h	-P h
127*	-C ₂ H ₅	H	-P h	-P h	-CH ₃	-P h
128	-C ₂ H ₅	H	-CH ₃	-CH ₃	-P h	-P h
129	n-C ₃ H ₇	H	-CH ₃	-P h	-C ₂ H ₅	化 2 4
130	-C l	1-C l	-P h	-P h	-CH ₃	化 3 2
131	-C l	H	化 2 5	化 2 5	化 3 8	化 2 4
132	-C l	2-CH ₃	H	-P h	-CH ₃	-P h
133	-C l	H	-P h	-P h	-CH ₃	-P h
134	-C l	H	-CH ₃	-P h	-CH ₃	化 3 9
135	-B r	H	H	-P h	-CH ₂ P h	-P h
136	H	H	-P h	-P h	-P h	-P h
137	H	1-CH ₃	-P h	-CH ₃	-CH ₃	化 3 2
138	H	H	-P h	-P h	-C ₂ H ₅	-P h
139*	-OCH ₃	H	-P h	-P h	-P h	-P h
140*	-OCH ₃	H	-P h	-P h	-C ₂ H ₅	-P h
141	-OCH ₃	H	-CH ₃	-CH ₃	-CH ₃	-P h
142	-OCH ₃	H	-C ₂ H ₅	-C ₂ H ₅	化 2 6	化 2 6
143	-OCH ₃	2-OCH ₃	-P h	-P h	-C ₂ H ₅	化 3 2
144	-OCH ₃	2-OCH ₃	-CH ₃	化 3 7	-CH ₃	化 3 7
145*	-OC ₂ H ₅	H	-P h	-P h	-CH ₃	-P h

[Table 6]

例示 化合 物No.	一般式 (V) の置換基					
	R ¹	R ²	R ³	R ⁴	A	B
146	(化 4 1)		-CH ₃	-CH ₃	-P h	-P h
147	(化 4 1)		化 2 6	化 2 6	-P h	-P h
148	(化 4 1)		-CH ₃	-P h	化 2 6	化 2 6
149'	(化 4 1)		-P h	-P h	-CH ₃	-P h
150	(化 4 1)		-P h	-P h	-CH ₂ P h	化 3 4
151	(化 4 1)		n-C ₃ H ₇	-P h	-CH ₃	化 2 6
152	(化 4 1)		-P h	-P h	(化 3 1)	
153	-CH ₃	H	-P h	-P h	(化 3 1)	
154	-CH ₃	H	化 2 5	化 2 5	(化 3 1)	
155	-CH ₃	H	-P h	-P h	(化 4 3)	
156	-C ₂ H ₅	H	-CH ₃	-CH ₃	(化 4 2)	
157	-OCH ₃	H	-CH ₃	化 3 2	(化 3 0)	
158	-OCH ₃	2-OCH ₃	-P h	-P h	(化 3 1)	
159	H	H	-P h	-P h	(化 4 2)	
160	H	H	-P h	化 2 5	(化 4 3)	
161	C 1	H	-CH ₃	-P h	(化 4 3)	

[0062] In these illustration compound, it excels in electrophotographic properties, and R¹ of the thing with few problems also in a cost aspect and a synthesis face is an electron donative group, R³ and R⁴ are [an aryl group, A, and B] a methyl group or an aryl group, It is illustration compound No. 115 specifically shown by * seal in Table 4 - 6, No. 116, No. 118, No. 126, No. 127, No. 139, No. 140, No. 145, No. 149, etc.

[0063] P- [N, N **J] (P **TORIRU) aminobenzaldehyde] -N', N' **JIFE nil hydrazone, and P **JIE chill amino benzoic aldehyde N', N' **JIFE nil hydrazone, 4- [N-(2, 2, **JIFE nil vinylidene)-N **FE nil aminobenzaldehyde] Other hydrazone compounds, such as -N' **MECHIRU and -N' **FE nil hydrazone, doria, such as G (P **TORIRU) phenylamine and diphenyl (2 **FUORENIRU) amine, -- a reel amine compound. Styryl compounds, such as a 4-(4 **KURORO styryl)-4' **MECHIRU triphenylamine and a 4 **METOKISHI** 4'-(4 **METOKISHI styryl) triphenylamine, other pyrazoline compounds, an oxazol compound, etc. may be made to contain.

[0064] The electro photography photo conductor of this invention demonstrates high performance for the compound shown above extremely one kind or by containing two or more kinds.

[0065] Drawing 1 - 6 explain the electro photography photo conductor of this invention typically.

[0066]Drawing 1 is the photo conductor in which the photosensitive layer (4) which blended charge generating material (3) and charge transfer material (2) with bonding agent resin was formed on the conductive substrate (1).

[0067]the layer (6) in which drawing 2 contained charge generating material as a photosensitive layer, and the layer (5) containing charge transfer material (2) -- a conductive substrate (1) top -- lamination **** -- it is the photo conductor formed of things.

[0068]Drawing 3 is the photo conductor in which the two layers (5) and (6) of drawing 2 were formed conversely. Drawing 4 is the photo conductor which provided the surface protection layer (7) in the photo conductor surface of drawing 1 further.

[0069]Drawing 5 provides an interlayer (8) between a conductive substrate (1) and a photosensitive layer (4), and an interlayer (8) is provided for the improvement of coating nature, improvement in the smooth nature of a base material, mechanical protection, an electric charge injectional improvement, etc.

[0070]drawing 6 provides an interlayer (8) between the layer (6) and conductive substrate (1) containing the charge generating material of drawing 2 -- an interlayer's (8)'s installation -- the case of drawing 5, and **** -- it is the same reason. As a material used for these surface protection layers and an interlayer, the below-mentioned polymer film formation binding material is used as a surface protection layer.

[0071]As a conductive substrate in the photo conductor of this invention, paper, a plastic film, etc. which performed a metal drum, a metal plate, and conductive processing can be raised.

[0072]As charge transfer material in the photosensitive layer of the photo conductor of this invention, N **FENIRU and N **NAFU chill enamine derivative which are shown by the above-mentioned general formula (I) are applied. N **FENIRU, N-4 which are shown by general formula (II) in detail - It is an enamine group content hydrazone compound shown by a vinylnaphthyl enamine derivative or general formula (V). Specifically, it is an illustration compound of the above-mentioned tables 1-6, etc.

[0073]The sensitization color and paints which are shown below are shown as charge generating material contained in the photosensitive layer of the photo conductor of this invention. As this sensitization color, Methyl Violet, Crystal Violet, The triphenylmethane dye represented with night blue, Victoria blue, etc., Erythrosine, rhodamine B, the rhodamine 3R, an acridine orange, The thiazine dye represented in acridine dye, methylene blue, methylene green, etc. which are represented by hula PEOSHIN etc., There are the oxazine color represented by Capri blue, meld rubble, etc., other cyanine dye, a styryl color, a pyrylium salt color, a thio pyrylium salt color, etc.

[0074]although these colors may be used alone -- paints -- coexistence **** -- an electric charge is generated at still higher efficiency by things in many cases. As paints of a photoconductivity made to generate an electric charge at very high efficiency by optical

absorption, Phthalocyanine pigment, such as non-[various metal phthalocyanines and] metal phthalocyanines and halogenation non-metal phthalocyanines, There are azo pigment, such as perylene system paints, such as perylene imide and a perylene acid anhydride, screw azo pigment, and tris azo pigment, other quinacridone series paints, anthraquinone system paints, etc. Especially the thing using non-metal-phthalocyanines paints, a CHITARONIUM phthalocyanine pigment, FUOREN, the screw azo pigment containing a fluorenone ring, the screw azo pigment that consists of aromatic amines, a tris azo pigment, etc. forms the electro photography photo conductor which gave high sensitivity and was excellent.

[0075]The case where various chemicals are added for the purpose of preventing the increase in the rest potential to repeated use, the fall of electrification potential, the fall of sensitivity, etc. apart from the charge generating material which raised above is needed. As a these-added substance, 1 **KURORO anthraquinone, benzoquinone, 2, 3 **JIKURORO naphthoquinone, naphthoquinone, 4, and 4' **JINITORO benzophenone, 4 and 4' **JIKURORO benzophenone, 4 **NITORO benzophenone, 4 **NITORO benzal chestnut dinitrile, Electronic suction nature compounds, such as alpha **SHIANO** beta-(P **SHIANO phenyl) ethyl acrylate, 9 **ANTORASENIRU methyl chestnut dinitrile, 1 **SHIANO** 1-(P **NITORO phenyl)-2-(P **KURORU phenyl) ethylene, 2, and 7 **JINITORO fluorenone, are raised. In addition, an antioxidant, a curl inhibitor, a leveling agent, etc. can be added as an additive to the inside of a photo conductor if needed.

[0076]N **FENIRU in the photo conductor of this invention, N **NAFU chill enamine derivative, a vinyl naphthyl enamine derivative, or an enamine group content hydrazone compound, i.e., charge transfer material, borrows the help of the bonding agent resin which has film forming property to up to a conductive substrate, and it uses it as a coat.

[0077]In this case, in order to raise sensitivity, it is desirable to add the above-mentioned charge generating material and the substance which gives plasticity to bonding agent resin, and to make it a uniform photo conductor coat.

[0078]As bonding agent resin which has these film forming property, various things are raised according to a field of the invention. That is, in the field of the object for copying machines, or the photo conductor for printers, polystyrene, a polyvinyl acetal, PORUSURUHON, polycarbonate, polyphenylene oxide, polyester, an alkyd resin, polyacrylate, etc. are preferred. It may be independent, or two or more sorts may be mixed, and these may be used.

Especially, a volume resistance value is more than 10^{13} ohm-cm, and resin, such as polystyrene, polycarbonate, polyacrylate, and polyphenylene oxide, is excellent in coat nature, the potential characteristic, etc.

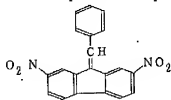
[0079]The quantity of these bonding agent resin is 0.5 to 5 times as many ranges preferably in a weight ratio to N **FENIRU and N **NAFU chill enamine derivative at 0.2 to 20 times. In the case of less than 0.5 time, the fault that a compound deposits from the photo conductor

surface arises, and if 5 times are surpassed, sensitivity lowering will be imitated remarkably, and it is **.

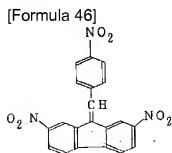
[0080] Especially in order to use it for a printing plate, an alkaline binding material is required. An alkaline binding material is a polymeric material which has a meltable acidic group, for example, an acid anhydride group, a carboxyl group, a phenolic hydroxyl group, a sulfonic group, a sulfonamide group, or a sulfonimide group in water or an alkaline alcoholic solvent (a mixed system contains).

[0081] As for these alkalinity binding material, it is preferred that acid value usually has 100 or more high values. Swelling of high polymeric material, i.e., bonding agent resin, of such acid values is carried out to an alkaline solvent easily dissolvable or easily. As these bonding agent resin, for example A styrene: maleic anhydride copolymer, A vinyl-acetate maleic anhydride copolymer, a vinyl-acetate crotonic acid copolymer, a methacrylic-acid: methacrylic-acid-ester copolymer, phenol resin, methacrylic acid: A styrene methacrylic-acid-ester copolymer etc. are shown. the quantity of these bonding agent resin -- the case of said photo conductor for copying machines, and **** -- it may be the same.

[0082] In a surface protection layer, they are 2, 4, 7 **TORI nitro fluorenon, and the following formula. [Formula 45]



2 come out of and shown, 7 **JINI trough 9 **BEN zylidene FUIOREN, the following formula [0083]



[0084] It may come out and electronic suction nature substances, such as 2 shown and 7 **JI** nitro 9-(4' **NITORO benzylidene) FUIOREN, may be added. As for thickness of a surface protection layer, 0.1micro - about 3micro are desirable.

[0085] As an interlayer, synthetic resins, such as polyimide, polyamide, a nitrocellulose, polyvinyl alcohol, casein, and hydroxyethyl cellulose, and a natural resin are used. Depending

on the case, conductive carbon black, titanium oxide, silicon oxide, an aluminum oxide, etc. may be added. As for thickness, 0.2micro - about 10micro are preferred.

[0086]A photo conductor of this invention embraces a gestalt of a photo conductor, and are N-phenyl and N in the above-mentioned various quality of an additive. - A naphthyl enamine derivative is dissolved or distributed in a suitable solvent, and it is considered as coating liquid, and on a conductive substrate which described this previously, it applies and dries and a photo conductor is manufactured.

[0087]As a spreading solvent, benzene, toluene, xylene, mono- chlorobenzene, Solvents, such as alcohols, acetonitrile, and methyl ethyl ketone, can be used solvents, such as which aromatic hydrocarbon, dioxane, dimethoxymethyl ether, dimethylformamide, and a methylene chloride, being able to be independent, or adding further two or more sorts of [a partially aromatic solvent or if needed].

[0088]In a photo conductor of this invention, various methods can be considered in a mode using N **FENIRU, N **NAFU chill enamine derivative, a vinyl naphthyl enamine derivative, or an enamine group content hydrazone compound. For example, this derivative or a compound can be used as charge transfer material, charge generating material and an electronic suction nature compound can be added, and a photo conductor applied on a conductive substrate by making into a photosensitive layer what dissolved or distributed in bonding agent resin can be shown. (Refer to drawing 1)

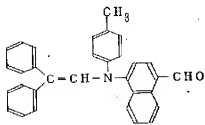
[0089]It is considered as a photosensitive layer of a laminated structure which consists of a high charge generating layer and a charge transfer layer of electric charge generating efficiency. Namely, this derivative or a compound on a charge generating layer which made a color (sensitization) or paints a subject as occasion demands, An antioxidant compound and an electronic suction nature compound can be added, it can be made to be able to dissolve or distribute in bonding agent resin, this can be laminated as a charge transfer layer, it can be considered as a photosensitive layer, and a photo conductor which laminated this photosensitive layer on a conductive substrate can be shown. (Refer to drawing 2)

[0090]

[Example]Although an example explains the photo conductor of this invention still in detail, this invention is not limited at all by these. The following of the synthetic example of the illustration compound used in the example is carried out.

[0091]The synthetic example 1 (composition of illustration compound No. 26)

** 4- [N- (2', 2' **JIFE nil vinylidene), N-(P **TORIRU) amino] Composition of alpha **NAFUTO aldehyde (the following structural formula) [Formula 47]



4- [N- (2', 2' **JIFE nil vinylidene), N-(P **TORIRU) amino] Naphthalene is melted in the dimethylformamide of a mol 10 times, is added under ice-cooling into the phosphorus oxychloride of a 1.2 time mol, and the dimethylformamide mixture of a 3 time mol, and, subsequently is made to react by 80 ** of bath temperature. Next, this reaction mixture is added into ice water, and continuously, in 4N-sodium hydroxide solution, the whole pH is made or more into seven, the depositing solid is taken out, and it rinses enough. Thus, recrystallization is performed for the obtained solid from isopropanol, and white powder (melting point 163.0-162.5 **) is obtained. Yield is 83.5%.

[0092]** Melt the synthetic above-mentioned aldehyde object of illustration compound No. 26 in dimethylformamide at necessary minimum, and add aldehyde and equimolar for phenylmethyl diethyl phosphonate to this. It stirs by adding a 1.5 times many potassium t **BUTOKISHI** side [as] mol to this under a room temperature. Thus, the obtained reaction mixture is diluted underwater, the precipitated crystal is taken out, and it rinses enough. Thus, recrystallization is performed for the obtained solid from methanol, and the needle crystal (melting point of 80.5-82.0 ******) of yellowish white is obtained. Yield is 78.5 (%).

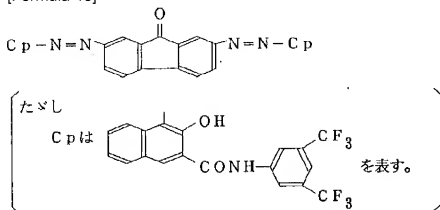
[0093]The synthetic example 2 (composition of illustration compound No. 115)
The aldehyde object and N **MECHIRU** N **FE nil hydrazine which were compounded by **
of the synthetic example 1 are added into equimolar isopropyl alcohol, and white powder is
promptly obtained by carrying out heating stirring. Recrystallization is performed for this
powder from ethyl acetate, and granular white crystals (126.5-128.0 **) are obtained. Yield is
91.7 (%). Other illustration compounds are easily compoundable according to the above-
mentioned synthetic example.

[0094]The electro photography photo conductor produced in the example evaluated electrophotographic properties by electrostatic recording paper test equipment (product SPmade from Kawaguchi electrical machinery-428). a measuring condition -- (-- applied voltage: -- it is -6kV and static No. 3), and light exposure E_{100} (the looks and second) and initial potential V_o (- bolt) which -700 by white light exposure (irradiation light = 5 lux) to -100V takes at attenuation **** were measured. Initial potential V_o (- bolt) and E_{100} (looks and second) after performing the same operation as 10,000 times were measured using the device by making ****-electric discharge (discharging light: glare for 1 second at 40 luxs according to

white light) into one cycle. By change of these V_o and E_{100} , the degree of degradation at the time of continuous use was investigated. These results are shown in Table 7 and Table 8.

[0095] In the 1% tetrahydrofuran (THF) solution of example 1 polyvinyl butyral resin (S lek B by Nissin Chemical Industry Co., Ltd.), it is a formula. [0096]

[Formula 48]



[0097] It came out, distribution was performed for the screw azo pigment shown in the paint conditioner (made by a red level company) for about 2 hours together with this resin and a glass bead with a weight ***** occasion diameter [the] of 1.5 mm, and the charge-generating-material solution was obtained.

[0098] The polyester film (80micro of thickness) of aluminum vacuum evaporation was made the next with the conductive substrate, the solution obtained above on the base material was applied with the doctor blade method, it dried and the charge generating layer was produced. The thickness after desiccation was 0.2micro. On this charge generating layer, 15% of solution which melted 1.2 g of polyacrylate (Unitika make U-100) for 1 g of illustration compound No. 26 obtained in the synthetic example 1 in the methylene chloride was applied by the skiing JINGU doctor, the charge transfer layer of 20 micro of dry membrane thickness was produced, and the electro photography photo conductor was obtained. (Refer to drawing 2) Characterization is shown in Table 7.

[0099] The electro photography photo conductor was obtained like Example 1 except changing Example 2 - 5 illustration compounds to No. 24, No. 34, No. 49, and No. 65. Evaluation of the characteristic is shown in Table 7.

[0100]

[Table 7]

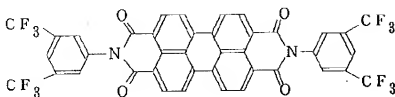
電子写真 感 光 体	例 示 化合物 No.	加 電 - 除 電			
		1 回 目 後		10000回後	
		初期 電 位	露光量*	初期 電 位	露光量*
		V_0 (-ボルト)	E_{100} ($\mu\text{J}/\text{cm}^2 \cdot \text{shot}$)	V_0 (-ボルト)	E_{100} ($\mu\text{J}/\text{cm}^2 \cdot \text{shot}$)
実施例1	26	860	1.0	830	1.0
実施例2	24	830	1.0	815	1.0
実施例3	34	845	0.9	810	0.9
実施例4	49	865	1.0	840	1.0
実施例5	65	815	1.8	790	1.7

* -700から-100Vに減衰さすに要する露光量

[0101]0.4 g of Example 6x type non-metal phthalocyanines (the Dainippon Ink make, fast gene blue 8120) are added into 30 ml of ethyl acetate solutions which melted 0.3 g of polyvinyl chloride acetate copolymers (S REXX M by Sekisui Chemical Co., Ltd.), Distribution was performed for about 20 minutes in the paint conditioner, it applied on the polyester film of aluminum vacuum evaporation with the doctor blade method, and the charge generating layer was made to form so that it may become 0.4 micro of thickness after desiccation.

[0102]The electro photography photo conductor which laminates the charge transfer layer of the polyacrylate containing the compound (melting point of 90.5-92.0 **) of illustration compound No. 25, and consists of two-layer composition on this charge generating layer was produced. When asked for the energy ($E_{1/2}$) and initial potential (V_0) which the potential reduction by half took the spectral sensitivity of 780 nm of this photo conductor, they were $V_0=720$ volt, $E_{1/2}=2.3$ (erg / cm^2), and a photo conductor of high electrostatic property whose sensitivity is dramatically high. The laser beam printer by a sharp company (WD-580P) was converted, this photo conductor was stuck on the drum part, the continuation copy was performed 10,000 times, and the degree of the initial potential drop and the fall of sensitivity was investigated. As for the result, change of the big value was not seen compared with $V_0=700$ (volt), $E_{1/2}=2.2$ (erg / cm^2), and the 1st time.

[0103]The aluminum board which performed alumite treatment to the example 7 surface was made into the conductive substrate, on it, the acetic acid vinyl polymer which carried out partial saponification was applied, and a 0.8micro interlayer was formed. Besides, [0104]Formula [Formula 49]



[0105] Come out and the peril imide system paints 0.2g and 10 g of polycarbonate resin (K-1300 made in Teijin Chemicals) which are shown 20 g of chlorobenzene, It put into the ball mill pot with the methylene chloride 100g, and distributed for 24 hours, illustration compound No.34 (melting point 83.5-85.0 °C) 8g was dissolved in these dispersion liquid, the sensitizing solution was prepared, it applied and dried, the photosensitive layer (18micro of thickness) of the mold (refer to [drawing 5](#)) was formed further, and the electro photography photo conductor was produced. Thus, electrophotographic properties were evaluated about the obtained one-layer type photo conductor. a measuring condition -- (-- applied voltage: -- it is the same as that of said Example 1 except carrying out by +6 kV and SUTATEKKU No. 3). The spectral sensitivity in $V_o = 690$ (volt), $E_{100} = 4.0$ (looks second), and 560 nm of the result was 3.3 (erg / cm²). Like Example 1, as a result of [10,000th (****ing applied voltage of +6 kV)] measuring, the fall of V_o obtained 2.0% of sensitivity lowering, and the dramatically stable measurement data 8.7%.

[0106] Example 8 styrene ethyl methacrylate : Illustration compound No. 16 (melting point 82.5-84.0 °C) are blended with methacrylic acid (styrene: ethyl methacrylate = 3:1 weight-ratio acid value value = 170) by the weight ratio of 2:1, 5% and 4-(P-2,4,6-trifluorophenyl)-2 of an illustration compound, and 6-2,4,6-trifluorophenyl-1,3,5-triazine-2,4,6-trisulfonic acid (CHIOPIRI Ruhm salt coloring matter) are added for N and N' 2,4,6-trifluorophenyl-1,3,5-triazine-2,4,6-trisulfonic acid at a rate of 0.5% of an illustration compound, respectively, it was considered as 10% of dioxan solution as a whole. This solution was applied on the aluminum board of scaling grained by the skiing JINGU doctor, it dried, the photosensitive layer of 7 micro of thickness was formed, and the electro photography photo conductor of the mold was produced further.

[0107] Electro photography nature evaluation by the above-mentioned SP-428 was performed about the photo conductor.

evaluation condition: -- applied voltage-static 6 kV -- the initial potential-of three 410 (volt) light reduction-by-half light exposure 4.4 (looks and second)

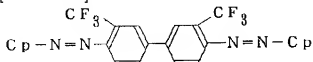
When this photo conductor was visible-image-ized with the developing material (toner) and was subsequently processed with the alkaline treating solution (6% triethanolamine, 10% ammonium carbonate, and polyethylene glycol of 20% of average molecular weights 190-210), the toner non-holdfast was eluted easily. By rinsing with the water which furthermore contained sodium silicate, the original printing plate was able to be produced easily.

[0108] When offset printing was performed using this original edition, it turned out that it is

equal also to printing of about 100,000 sheets. The optimum light exposure for acquiring a toner visible image was for 1.0 second in 500 luxs. (Light source: Halogen lamp) When producing an original printing plate, direct platemaking performed not using block-copy material.

[0109]In the tetrahydrofuran (THF) solution of 1% of example 9 polyvinyl butyral resin (S lek B by Nissin Chemical Industry Co., Ltd.), it is a formula. [0110]

[Formula 50]



(たゞし、Cpは前述化48と同じ)

[0111]It came out, distribution was performed for the screw azo pigment shown in the state together with a glass bead 1.5 mm in diameter for about 2 hours in this resin and the said weight ***** occasion paint conditioner (made by a red level company), and the charge-generating-material solution was obtained.

[0112]The polyester film (80micro of thickness) of aluminum vacuum evaporation was made the next with the conductive substrate, the solution obtained above on the base material was applied with the doctor blade method, it dried and the charge generating layer of 0.2 micro of thickness was produced. On this charge generating layer, 15% of solution which melted 1.2 g of polyarylate resin (Unitika make U-100) for 1 g of illustration compound No. 115 obtained in the synthetic example 2 in the methylene chloride is applied by a skiing JINGU doctor, The charge transfer layer of 20 micro of dry membrane thickness was formed, and the electro photography photo conductor of the lamination type was produced. Evaluation of the characteristic is shown in Table 8.

[0113]The electro photography photo conductor was obtained like Example 9 except setting example 10-13 illustration compound No. 115 to No. 104, No. 109, No.124, and No. 146. Evaluation of the characteristic is shown in Table 8.

[0114]

[Table 8]

電子写真 感 光 体	例 示 化合物 No.	加 電 - 除 電			
		1 回 目 後		10000回後	
		初 期 電 位	露 光 量*	初 期 電 位	露 光 量*
		V_0 (-ボルト)	E_{100} (ルクス・秒)	V_0 (-ボルト)	E_{100} (ルクス・秒)
実施例9	115	975	1.2	960	1.1
実施例10	104	940	1.2	930	1.2
実施例11	109	970	1.7	945	1.6
実施例12	124	915	2.1	890	2.0
実施例13	146	960	1.2	745	1.2

*表7と同じ

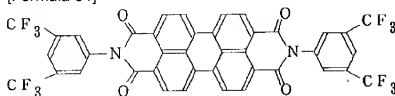
[0115]The charge generating layer was made to form on a conductive substrate like example 14 Example 6. The electro photography photo conductor which laminates the charge transfer layer of the polyarylate containing illustration compound No. 118 (melting point of 136.5-138.0 **), and consists of two-layer composition on this charge generating layer was produced. When asked for the energy ($E_{1/2}$) and initial potential (V_0) which the potential reduction by half took the spectral sensitivity of 780 nm of this photo conductor, they were $V_0=920$ volt, $E_{1/2}=2.8$

(erg / cm²), and a photo conductor of high electrostatic property whose sensitivity is dramatically high. The laser beam printer by a sharp company (WD-580P) was converted, this photo conductor was stuck on the drum part, the continuation copy was performed 10,000 times, and the degree of the initial potential drop and the fall of sensitivity was investigated. As for the result, change of the big value was not seen compared with $V_0=905$ (bolt), $E_{1/2}=2.7$

(erg / cm²), and the 1st time.

[0116]The aluminum board which performed alumite treatment to the example 15 surface was made into the conductive substrate, on it, the acetic acid vinyl polymer which carried out partial saponification was applied, and a 0.8-micro interlayer was formed. Besides[0117]

[Formula 51]



[0118]Come out and the peril imide system paints 0.2g and 10 g of polycarbonate (made in K-1300 Teijin Chemicals) which are shown 20 g of chlorobenzene, It put into the ball mill pot with the methylene chloride 60g, and distributed for 24 hours, illustration compound No. 145 (melting point 133-135 °C) 8g was dissolved in these dispersion liquid, the sensitizing solution was prepared, it applied and dried, the photosensitive layer (18micro of thickness) of the mold (refer to drawing 5) was formed further, and the electro photography photo conductor was produced.

[0119]Thus, electrophotographic properties were evaluated about the obtained one-layer type photo conductor. a measuring condition -- (applied voltage: -- it is the same as that of said Example 1 except carrying out by +6 kV and SUTATEKKU No. 3). The spectral sensitivity in $V_o = 780$ (volt), $E_{100} = 4.2$ (looks and second), and 560 nm of the result was 3.6 (erg / cm²). The fall of a measurement result and V_o obtained 2.5% of sensitivity lowering, and the dramatically stable measurement data 7.5% by the 10,000th (***ing applied voltage of +6 kV) time like Example 1.

[0120]example 16 styrene: -- ethyl methacrylate: -- methacrylic acid (styrene: ethyl methacrylate =3:1 weight ratio acid value value =170) and illustration compound No. 115 by the weight ratio of 2:1, [blend and] 5% and 4-(P **JIE chill aminophenyl)-2 of an illustration compound, and 6 **JIFENIRUCHIOPIRI Ruhm perchlorate (CHIOPIRI Ruhm salt coloring matter) are added for N and N' **JIE chill barbituric acid at a rate of 0.5% of an illustration compound, respectively, it was considered as 10% of dioxan solution as a whole. This solution was applied on the aluminum board of scaling grained by the skiing JINGU doctor, it dried, the photosensitive layer of 7 micro of thickness was formed, and the electro photography photo conductor of the mold was produced further. Thus, electro photography nature evaluation by the above-mentioned SP-428 was performed about the produced photo conductor.

[0121]evaluation condition: -- applied voltage-static 6 kV -- the initial potential-of three 420 (volt) light reduction-by-half light exposure 5.2 (looks and second)

When this photo conductor was visible-image-ized with the developing material (toner) and was subsequently processed with the alkaline treating solution (6% triethanolamine, 5% ammonium carbonate, and polyethylene glycol of 20% of average molecular weights 190-210), the toner non-holdfast was eluted easily. By rinsing with the water which furthermore contained sodium silicate, the original printing plate was able to be produced easily. When offset printing was performed using this original edition, it turned out that it is equal also to printing of about 100,000 sheets. The optimum light exposure for acquiring a toner visible image was for 1.1 seconds in 500 luxs. (Light source: Halogen lamp) When producing an original printing plate, direct platemaking performed not using block-copy material.

[0122]

[Effect of the Invention]The electro photography photo conductor of this invention is excellent in the stability to temperature and humidity, and its electrifying characteristic is high, and, in repeated use, the fall of photosensitivity does not take place.

[Translation done.]